Public Health and Preventive Medicine

Injuries and Fatalities Associated With Off-Road Three-Wheeled All-Terrain Vehicles

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This is one of a series of articles from western state public health departments.

In the past several years, three-wheeled all-terrain vehicles (ATVs) have gained widespread popularity in the United States. Originally used by farmers and sportsmen for transportation away from established roads, ATVs are now predominantly used for purely recreational purposes. These three-wheeled motorcycles with large balloonlike tires have engine displacements that vary from 60 to 400 cc and can attain speeds of up to 70 mph. They range in cost from about $600 to more than $2,500, and weigh from 75 to more than 180 kg (170 to 400 lb). Driving skills for ATVs are considerably different from those required for driving a car or a two-wheeled motorcycle. The Consumer Product Safety Commission (CPSC) has noted a sharp increase in serious injuries and fatalities associated with the use of ATVs. The estimated number of ATV-related injuries reported through CPSC's National Electronic Injury Surveillance System increased from 8,600 in 1982 to 85,000 in 1985. As of July 1986, more than 559 ATV-related deaths had been reported to the CPSC. It is estimated that over 750,000 ATVs were sold in the United States in 1985, and sales of these vehicles are continuing to increase dramatically. Data collected by the CPSC showed that 19% of the injuries involving ATVs have occurred to users younger than 12 years, with 46% occurring among users younger than 16 years.[1] The increasing use of these vehicles coupled with the young age of accident victims has prompted several state health departments to monitor injuries and fatalities associated with ATVs. In New Mexico, the Health and Environment Department is conducting a prospective study of ATV-related injuries and deaths in conjunction with several hospitals and the state's Office of the Medical Investigator. The following incident illustrates several problems with the use of ATVs.

Report of a Case

On August 27, 1985, a 14-year-old unhelmeted girl was riding an ATV along an irrigation ditch bank road when she apparently locked up the front brake and was thrown over the vehicle. She struck the corner of the metal frame of an irrigation channel lock with her head, fell into the irrigation ditch and drowned. Her body was found about two miles downstream by her brother. The medical investigator report indicated the cause of death as drowning due to a skull fracture.

Discussion

This incident shows several problems associated with the use of ATVs. First, the operator of this ATV was young and unlicensed. Second, she was not wearing a helmet or other protective gear. Third, she was not being supervised by an adult. Finally, the driver did not have the experience and agility to properly operate the ATV. Although ATVs were designed for use off road, by a single rider, the CPSC survey[1] found that 35% of ATV accidents involved practices that the ATV manufacturers warned against: carrying passengers and driving on paved roads.

A recent study in Alaska[2] identified 20 deaths and 538 injuries in a 24-month period that were associated with three-wheeled ATVs. Six accident victims received severe head or spinal cord injuries and are now permanently disabled and require long-term skilled care. Interestingly, 63% of incidents in Alaska occurred on established roads (probably due to the use of ATVs for subsistence and recreational hunting, fishing and basic transportation). Significant risk factors associated with ATV injuries included alcohol use, lack of helmet use, rider inexperience and inattention and excessive speed. Their data suggested that 60% of the fatalities may have been prevented if a helmet had been worn.

Cogbill and colleagues suggest that morbidity and mortality due to ATV-associated accidents may be reduced through three approaches: (1) increased awareness of the potential dangers of these vehicles, (2) protective devices and (3) regulation of three-wheeled motorcycles and their drivers.[3] It is clear that these vehicles should only be operated by experienced drivers who have the required skills, strength and agility. They should be used off the road (the use for which they were designed) with only one rider per vehicle. Protective gear such as boots, long pants, gloves, goggles and a proper helmet are essential for any ATV rider. Young, inexperienced or unprotected persons should not be riding or operating an ATV.

We recommend that legislative efforts be directed toward young ATV riders. Specifically, ATV operators should be required to have the equivalent of a motorcycle operator's license and be at least 15 years of age. Helmet use should be mandatory for these and other types of motorcycles. ATVs designed exclusively for very young riders should be banned.

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ABBREVIATIONS USED IN TEXT
ATV = all-terrain vehicle
CPSC = Consumer Product Safety Commission

Furthermore, it is essential that police enforce existing laws that prohibit the use of unregistered vehicles (most ATVs) on public roads. Manufacturers and retailers can assist injury prevention efforts by emphasizing the use of protective gear, such as helmets, and by marketing ATVs only for older ATV riders. States can develop safety training manuals[4] and sponsor ATV safe-riding courses. The need for training is shown by the fact that 47% of those injured by collision and 26% of those injured when the vehicle overturned had less than a month's driving experience.[1] Studies that compare the relative stability of three-wheeled ATVs with two- and four-wheeled cycles are needed. Preliminary data suggest that the three-wheeled ATVs are more dangerous than four-wheeled ATVs.[5] Hospital-based studies to document the extent of the problem could be better achieved by improving medical record documentation and coding of ATV accidents.

REFERENCES

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Medical Practice Question

EDITOR'S NOTE: *From time to time medical practice questions from organizations with a legitimate interest in the information are referred to the Scientific Board by the Quality Care Review Commission of the California Medical Association. The opinions offered are based on training, experience and literature reviewed by specialists. These opinions are, however, informational only and should not be interpreted as directives, instructions or policy statements.*

Diagnosis of Obstructive Sleep Apnea in Children

QUESTION:

What criteria are necessary for the diagnosis of obstructive sleep apnea in children?

OPINION:

In the opinion of the Scientific Advisory Panels on Otolaryngology/Head and Neck Surgery and Pediatrics, the diagnosis of obstructive sleep apnea, described physiologically as a cessation of airflow at the nose and mouth with the concomitant occurrence of inspiratory efforts, can be established in children by a thorough history and physical examination. Criteria necessary to make this diagnosis must include a history of snoring and apnea during sleep (documented by reliable observers) and usually include some or many of the following signs: restless sleep and abnormal sleep positions; repetitive awakening at night; nocturnal enuresis; daytime somnolence; mouth breathing while awake; large tonsils and adenoids; craniofacial abnormalities; irritability, and hyperactivity.

Though it is not always necessary, the polysomnogram is the only sleep study that can provide a definitive diagnosis of obstructive sleep apnea. This multi-channel recording of physiologic parameters during sleep varies in its components from center to center. To diagnose significant sleep apnea, however, it must include a measure of airflow, chest wall movement and oxygenation. Significant obstructive apnea on a polysomnogram is defined as the absence of airflow in the presence of chest wall movement for more than 15 seconds (or of shorter duration if associated with arrhythmia, hypoxemia and hypercarbia). Significant partial obstructive apnea is defined as an impairment or partial absence of airflow associated with the three conditions just noted. Polysomnography should be used when the results will clearly make a difference in the differential diagnosis or in the treatment plan. The pneumogram, which measures impedance respiration and heart rate, is not polysomnography and is totally inappropriate for the study of suspected obstructive sleep apnea.

Finally, obstructive sleep apnea in children must *not* be confused with apnea of infancy, the so-called near-miss sudden infant death syndrome, which is generally defined as an unexplained episode of cessation of breathing for 20 seconds or longer, or a shorter respiratory pause associated with bradycardia, cyanosis or pallor.